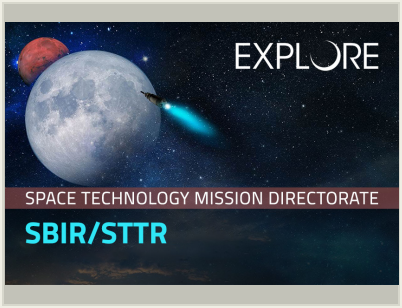
Atmospheric Aerosol Analysis using Lightweight Mini GC, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

The major components of manmade aerosols are created by the burning of coal and oil. These aerosols are recognized to have a significant climatic impact through their effects on solar and terrestrial radiation. The accurate speciation and measurement of the composition of these aerosols is an important first step in understanding and managing these pollutants. This proposal focuses on the development of a detection system specifically for the collection, speciation and identification of gas phase and aerosolized organics. The proposed portable system will be approximately 1/10 the size and 1/5 the cost of traditional bench top analytical units and will be capable of sample collection and battery operation without the need for compressed bottled gas. The Seacoast system will integrate its proprietary chemicapacitive sensor array technology and commercial sensors with a preconcentration/chromatography system, combining selectivity from a diverse sensor array with a miniature sampling system for amplified sensitivity. The specific components will be: 1) vapor collection pump, 2) sample preconcentrator capable of being heated quickly and in stages, 3) capillary column to separate the chemicals released from the preconcentrator and provide selectivity, 4) the chemical sensor array containing Seacoast's chemoselective microcapacitors or "chemicapacitors" and metal-oxide-based detectors, 5) integrated user interface. The system will be designed to be modular so as to allow further expansion with other sensor technologies. In addition the Seacoast system utilizes air, sampled from its environment, as a carrier gas thus requiring no bottled gas for increased portability and ease of use. The system will be capable of both gas phase (sampling from the environment) and liquid phase (from direct injection of possible source pollutants) operation.



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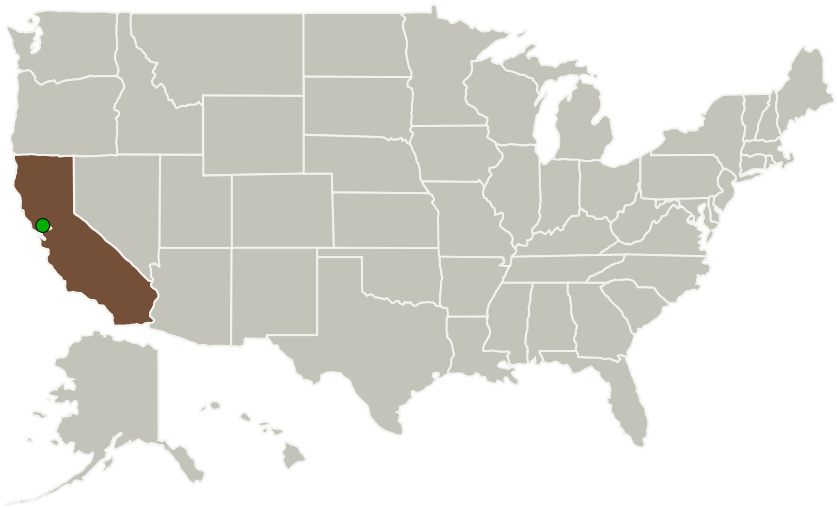
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Seacoast Science, Inc.	Lead Organization	Industry	Carlsbad, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140004)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Seacoast Science, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Sanjay V Patel

Co-Investigator:

Sanjay J Patel

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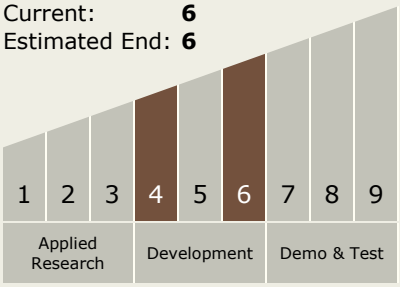
Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System